twelve medium bergs, in field ice, ice to the northward as far as could be seen, sailed thirty miles south before clearing field.

21st.—N. 42° 49′, W. 52° 20′, large berg; N. 42° 52′, W. 53° 36′, small bergs; N. 43° 00′, W. 50° 00′, several bergs.

22d.—N. 42° 52′, W. 49° 42′, pieces of ice; N. 43° 34′, W. 47° 41′, two bergs; N. 43° 23′, W. 48° 01′, small berg; N. 43° 20′, W. 48° 20′, large round berg.

24th.—N. 44° 23′, W. 45° 27′, moderate sized berg.

25th.—N. 46° 40′, W. 39° 50′, berg; N. 44° 16′, W. 45° 07′, five bergs; N. 43° 28′, W. 51° 04′, large berg.

26th.—N. 42° 21′, W. 48° 55′, large mound of ice; N. 42° 29′, W. 48° 54′, large berg.

27th.—N. 44° 15′, W. 45° 30′, large berg; N. 44° 05′, W. 46° 00′, a long, low, and very dangerous berg, estimated length several miles.

28th.—N. 42° 48′, W. 49° 22′ to N. 42° 53′, W. 49° 52′, four bergs; N. 41° 40′, W. 48° 50′, medium berg; N. 45° 07′, W. 44° 00′ to N. 43° 35′, W. 47° 35′, five large and two small bergs.

29th.—N. 45° 24′, W. 44° 29′, several long, low, and high bergs; N. 40° 30′, W. 45° 45′, small bergs and field ice; N. 46° 41′, W. 40° 14′, berg; N. 44° 20′, W. 46° 00′, large berg; N. 43° 35′, W. 47° 35′, small berg.

30th.—N. 43° 06′, W. 49° 36′, large flat piece of ice; N. 42° 53′, W. 49° 50′, large, thick, solid berg; N. 43° 20′, W. 49° 50′, large berg; N. 46° 40′, W. 42° 30′ to N. 46° 20′, W. 43° 00′, eight large bergs; N. 43° 27′, W. 50° 31′, large berg; N. 43° 26′, W. 50° 56′, very large berg, about two hundred feet high and fully one thousand feet long; N. 44° 40′, W. 43° 40′, three large bergs; N. 43° 00′, W. 50° 00′, three large and two small bergs.

31st.—N. 44° 48′, W. 45° 10′, four very large flat bergs; N. 43° 00′, W. 48° 12′, two bergs and broken ice.

## 5 FOG IN MARCH.

The limits of fog belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on nine dates; between the fifty-fifth and sixty-fifth meridians on eight dates; and west of the sixty-fifth meridian on six dates. Compared with the corresponding month of the last two years the dates of occurrence of fog near the Grand Banks numbered seven less than the average; between the fifty-fifth and sixty-fifth meridians one less than the average; and west of the sixty-fifth meridian the same as the average. Over and near the Banks of Newfoundland fog was reported on the 1st, 2d, 6th, 16th, 17th, 29th, and 30th with the approach or passage to the northward of low pressure storms; on the 4th with unsettled weather attending the disappearance of an area of low pressure over the Gulf of Saint Lawrence; and on the 14th with stormy weather attending the presence of a cyclonic area to the eastward and a second cyclonic area over the Saint Lawrence Valley. Between the fifty-fifth and sixty-fifth meridians fog was reported on the 2d, 12th to 14th, 22d, 23d, 28th, and 29th, with the approach or passage to the northward of areas of low pressure. West of the sixty-fifth meridian fog was reported on the 2d, 3d, 22d, 23d, 26th, and 29th, attending the passage to the northward of areas of low pressure.

The following are limits of fog-areas on the north Atlantic Ocean, west of the fortieth meridian, for March, 1890, as reported by shipmasters:

| Date. | Entered. | | Cleared. | | Date. | Entered. | | Cleared. | |
|---|---|---|---|---|---|---|---|---|---|
| | Lat. N. | Lon. W. | Lat. N. | Lon. W. | | Lat. N. | Lon. W. | Lat. N. | Lon. W. |
| | ° ′ | ° ′ | ° ′ | ° ′ | | ° ′ | ° ′ | ° ′ | ° ′ |
| 1-2 | 42 07 | 49 42 | 41 30 | 55 14 | 16-17 | 44 00 | 48 10 | 42 56 | 54 30 |
| 2 | 42 06 | 62 40 | 41 41 | 64 37 | 17 | 42 03 | 49 42 | 42 02 | 50 23 |
| 2 | 41 12 | 64 13 | 41 10 | 64 39 | 22 | 37 58 | 75 03 | 38 26 | 74 49 |
| 2 | 40 15 | 70 00 | 40 30 | 71 45 | 22 | 41 54 | 55 41 | 41 52 | 56 13 |
| 2-3 | 33 45 | 74 38 | 33 55 | 74 32 | 22 | 41 14 | 64 58 | 41 12 | 65 30 |
| 3-4 | 43 00 | 48 00 | 43 00 | 51 00 | 23 | 41 04 | 67 05 | 40 33 | 69 43 |
| 3-4 | 42 30 | 49 18 | 42 17 | 55 29 | 23 | 44 04 | 63 55 | 43 30 | 64 38 |
| 6 | 42 00 | 49 00 | 42 00 | 52 30 | 26 | 40 34 | 69 14 | 40 29 | 70 21 |
| 12 | 42 27 | 65 49 | 42 25 | 66 50 | 28-29 | 43 04 | 63 20 | 43 04 | 67 20 |
| 13-14 | 41 34 | 60 24 | 42 05 | 66 20 | 29 | 42 34 | 63 00 | 42 36 | 64 16 |
| 14 | 41 15 | 49 15 | 41 21 | 48 00 | 29-30 | 42 24 | 49 40 | 42 14 | 51 52 |
| 14 | 40 42 | 56 02 | 40 50 | 58 10 | | | | | |

## 6 TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for March, 1890, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

For March, 1890, the mean temperature was highest over extreme southern Florida and in the lower Rio Grande valley, where the mean values were above 70°, the highest mean reading, 71°.2, being reported at Rio Grande City, Tex. Over the Florida Peninsula, extreme southern Mississippi, generally over the southern half of Louisiana, the southern half of Texas east of the ninety-eighth meridian, in the more southern part of western Texas, and in extreme southwestern Arizona the mean temperature was above 60°. South of a line traced from the coast of northern North Carolina irregularly south of west to northern Texas, thence southwestward to south-central Arizona, thence to central Arizona, and thence northwestward to the California coast near the fortieth parallel the mean temperature was above 50°. The lowest mean readings were noted in Manitoba and in extreme northern Ontario, where they were below 10°, the lowest mean temperature, 6°, being reported at Winnipeg, Man. The mean values were below 20° north of a line traced from south of Rockliffe, Ont., to upper Michigan, thence irregularly westward to central North Dakota, and thence northwestward to the British Possessions north of eastern Montana; the mean temperature was also below 20° at stations in west-central Colorado. North of a line traced from Cape Breton Island, Gulf of Saint Lawrence, south of west to southern Iowa, and thence northwestward to extreme northwestern Montana, and over a considerable area of west-central Colorado the mean temperature was below 30°. On the immediate north Pacific coast the mean temperature varied from 43° to 47°; on the middle Pacific coast, from 47° to 55°; and on the south Pacific coast, from 52° to 58°.

For March, 1890, the mean temperature was generally above the normal along the eastern slope of the Rocky Mountains, from the south Pacific coast eastward over Texas, along the immediate Atlantic coast north of South Carolina, in New England, the Canadian Maritime Provinces, the Saint Lawrence Valley, the eastern part of the lower lake region, the northeastern part of the upper lake region, and in eastern Manitoba; elsewhere the month was cooler than usual. The greatest departures above the normal temperature were noted in eastern Nova Scotia and on the coast of northern North Carolina, where they exceeded 4°, and the departures above the normal were more than 3° in the central Saint Lawrence valley and in New Mexico. The greatest departures below the normal temperature were reported in central and northern Illinois, and in the British Possessions north of Montana, where they equalled or exceeded 5°; and over the entire upper Mississippi valley and in the middle Sacramento valley the departures below the normal temperature were more than 4°.

The following are some of the most marked departures from the normal at the older established stations:

| Above normal. | ° | Below normal. | ° |
|---|---|---|---|
| Cape Henry, Va | 4.4 | Springfield, Ill | 5.8 |
| Halifax, N. S | 4.0 | Riley, Ill | 5.8 |
| Montreal, Quebec | 3.0 | Qu'Appelle, N. W. T | 5.0 |
| Santa Fé, N. Mex | 3.0 | Sacramento, Cal | 4.2 |
| Fort Shaw, Mont | 2.9 | Wellsborough Pa | 3.5 |

At Springfield, Ill., eleven years record, the current month was the coolest March ever noted for that station; the lowest mean temperature previously reported for March being 35°.4 in 1888. At Keokuk, Iowa, the mean temperature, 32°.6, was the same as the lowest mean previously reported, noted in 1877, and at Key West, Fla., the mean temperature has been lower in March in but one year, 1889.

## DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for March for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for March, 1890; (4) the departure of the current month from the normal; (5) and the extreme monthly means for March, during the period of observation and the years of occurrence:

*Deviations from normal temperatures*—Continued.

| State and station. | County. | (1) Normal for the month of March. | (2) Length of record. | (3) Mean for March, 1890. | (4) Departure from normal. | (5) Extreme monthly mean temperature for March. Highest. | Year. | Lowest. | Year. |
|---|---|---|---|---|---|---|---|---|---|
| *Arkansas.* | | ° | Years | ° | ° | ° | | ° | |
| Lead Hill | Boone | 48.7 | 8 | 46.4 | — 2.3 | 55.4 | 1882 | 45.5 | 1885 |
| *California.* | | | | | | | | | |
| Sacramento | Sacramento | 54.8 | 37 | 49.3 | — 5.5 | 59.8 | 1853 | 48.8 | 1880 |
| *Connecticut.* | | | | | | | | | |
| Middletown | Middlesex | 32.4 | 21 | 32.7 | + 0.3 | 40.7 | 1871 | 25.7 | 1872 |
| *Florida.* | | | | | | | | | |
| Merritt's Island | Brevard | 64.8 | 7 | 62.9 | — 1.9 | 71.1 | 1884 | 61.6 | 1889 |
| *Georgia.* | | | | | | | | | |
| Forsyth | Monroe | 56.9 | 16 | 55.4 | — 1.5 | 61.7 | 1880, '82 | 51.4 | 1885 |
| *Illinois.* | | | | | | | | | |
| Peoria | Peoria | 38.4 | 34 | 35.1 | — 3.3 | 45.8 | 1871 | 29.4 | 1867 |
| Riley | McHenry | 31.4 | 33 | 25.6 | — 5.8 | 41.7 | 1878 | 23.8 | 1872 |
| *Indiana.* | | | | | | | | | |
| Vevay | Switzerland | 42.7 | 23 | 39.4 | — 3.3 | 50.7 | 1878 | 35.7 | 1885 |
| *Iowa.* | | | | | | | | | |
| Cresco | Howard | 26.3 | 18 | 22.6 | — 3.7 | 42.3 | 1878 | 19.6 | 1888 |
| Monticello | Jones | 32.1 | 36 | 27.8 | — 4.3 | 45.8 | 1878 | 23.8 | 1867 |
| Logan | Harrison | 35.2 | 16 | 31.6 | — 3.6 | 48.0 | 1878 | 28.3 | 1875 |
| *Kansas.* | | | | | | | | | |
| Lawrence | Douglas | 42.3 | 26 | 37.8 | — 4.5 | 51.2 | 1868 | 34.2 | 1876 |
| Wellington | Sumner | 43.9 | 11 | 43.9 | 0.0 | 49.6 | 1879 | 39.0 | 1883 |
| *Louisiana.* | | | | | | | | | |
| Grand Coteau | Saint Landry | 61.9 | 7 | 61.2 | — 0.7 | 66.2 | 1884 | 59.5 | 1885 |
| *Maine.* | | | | | | | | | |
| Gardiner | Kennebec | 29.2 | 49 | 29.5 | + 0.3 | 37.5 | 1871 | 13.4 | 1884 |
| *Maryland.* | | | | | | | | | |
| Cumberland | Allegany | 37.0 | 31 | 36.3 | — 0.7 | 46.0 | 1878 | 30.0 | 1875 |
| *Massachusetts.* | | | | | | | | | |
| Amherst | Hampshire | 32.7 | 54 | 31.9 | — 0.8 | 40.5 | 1871 | 24.5 | 1843 |
| Newburyport | Essex | 32.1 | 10 | 33.0 | + 0.9 | 36.7 | 1889 | 27.0 | 1885 |
| Somerset | Bristol | 34.1 | 17 | 35.2 | + 1.1 | 39.8 | 1878 | 28.2 | 1885 |
| *Michigan.* | | | | | | | | | |
| Kalamazoo | Kalamazoo | 31.2 | 14 | 30.2 | — 1.0 | 42.2 | 1878 | 22.5 | 1885 |
| Thornville | Lapeer | 30.9 | 13 | 28.3 | — 2.6 | 41.1 | 1878 | 21.0 | 1885 |
| *Minnesota.* | | | | | | | | | |
| Minneapolis | Hennepin | 24.9 | 25 | 22.2 | — 2.7 | 43.6 | 1878 | 11.6 | 1867 |
| *Montana.* | | | | | | | | | |
| Fort Shaw | Lewis & Clarke | 33.0 | 19 | 35.9 | + 2.9 | 41.8 | 1889 | 21.7 | 1870 |
| *New Hampshire.* | | | | | | | | | |
| Hanover | Grafton | 27.8 | 56 | 27.8 | 0.0 | 35.5 | 1871 | 19.0 | 1872, '75 |
| *New Jersey.* | | | | | | | | | |
| Moorestown | Burlington | 37.5 | 27 | 37.2 | — 0.3 | 45.4 | 1871 | 29.7 | 1885 |
| South Orange | Essex | 35.7 | 18 | 34.8 | — 0.9 | 42.5 | 1878 | 28.5 | 1872 |
| *New York.* | | | | | | | | | |
| Cooperstown | Otsego | 27.4 | 36 | 26.3 | — 1.1 | 37.2 | 1871 | 18.3 | 1885 |
| Palermo | Oswego | 27.2 | 30 | 27.8 | + 0.6 | 38.1 | 1878 | 17.1 | 1885 |
| *North Carolina.* | | | | | | | | | |
| Lenoir | Caldwell | 45.6 | 16 | 44.4 | — 1.2 | 51.6 | 1878 | 35.0 | 1877 |
| *Ohio.* | | | | | | | | | |
| N'th Lewisburgh | Champaign | 37.7 | 58 | 35.0 | — 2.7 | 48.0 | 1842 | 21.0 | 1843 |
| Wauseon | Fulton | 30.9 | 21 | 30.8 | — 0.1 | 43.2 | 1878 | 24.5 | 1885 |
| *Oregon.* | | | | | | | | | |
| Albany | Linn | 47.6 | 10 | 45.6 | — 2.0 | 53.0 | 1885 | 40.4 | 1880 |
| Eola | Polk | 45.5 | 20 | 43.4 | — 2.1 | 54.2 | 1884 | 38.8 | 1880 |
| *Pennsylvania.* | | | | | | | | | |
| Dyberry | Wayne | 28.6 | 25 | 27.5 | — 1.1 | 36.9 | 1878 | 19.5 | 1885 |
| Grampian Hills | Clearfield | 30.6 | 25 | 28.4 | — 2.2 | 40.4 | 1878 | 20.1 | 1885 |
| Wellsborough | Tioga | 31.3 | 10 | 27.8 | — 3.5 | 37.6 | 1882 | 22.4 | 1885 |
| *South Carolina.* | | | | | | | | | |
| Statesburgh | Sumter | 52.9 | 9 | 53.6 | + 0.7 | 59.0 | 1882 | 48.3 | 1885 |
| *Tennessee.* | | | | | | | | | |
| Austin | Wilson | 47.5 | 19 | 45.4 | — 2.1 | 57.3 | 1868 | 40.8 | 1876 |
| Milan | Gibson | 47.5 | 7 | 43.4 | — 3.1 | 50.2 | 1887, '89 | 43.4 | 1890 |
| *Texas.* | | | | | | | | | |
| New Ulm | Austin | 62.4 | 17 | 62.5 | + 0.1 | 63.9 | 1879 | 51.8 | 1888 |
| *Vermont.* | | | | | | | | | |
| Strafford | Orange | 26.0 | 17 | 25.8 | — 0.2 | 33.8 | 1878 | 17.2 | 1883 |
| *Virginia.* | | | | | | | | | |
| Birdsnest | Northampt'n | 45.1 | 21 | 46.4 | + 1.3 | 54.1 | 1878 | 35.8 | 1872 |
| *Wisconsin.* | | | | | | | | | |
| Madison | Dane | 30.2 | 25 | 25.2 | — 5.0 | 37.1 | 1889 | 23.2 | 1888 |
| *Washington.* | | | | | | | | | |
| Fort Townsend | Jefferson | 44.8 | 17 | 43.1 | — 1.7 | 50.7 | 1885 | 38.7 | 1880 |

## MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported by a regular station of the Signal Service was 103°, at Rio Grande City, Tex., on the 27th, and the maximum temperature rose to, or above, 90° over a greater part of the interior of Texas, at Yuma, Ariz., and at Micco, Fla. North of a line traced from the South Carolina coast westward to central Mississippi, thence northward to western Tennessee, thence westward over the northern part of Indian Territory, and thence southwestward to extreme southwestern New Mexico, and over southwestern Arizona, at Los Angeles, Cal., and at stations in extreme southeastern Virginia the maximum temperature was above 80°. The lowest maximum temperature, 40°, was reported at Marquette, Mich., and Saint Vincent, Minn. The maximum values were below 50° in eastern, extreme southeastern, and northern New England, and north of a line traced over central Michigan and southern Wisconsin, thence northward to the western extremity of Lake Superior, thence southwestward to northeastern South Dakota, and thence west of north over North Dakota. At stations in the Atlantic coast and west Gulf states, the Rio Grande Valley, and the southeastern slope of the Rocky Mountains the maximum temperature was as high or higher than reported for March of preceding years. At New London, Conn., twenty years record, the maximum temperature for the current month, 64°, was the same as that of 1878; at Albany, N. Y., seventeen years record, 67°, the same as maximum of 1886; Baltimore, Md., twenty years record, 77°, 1° above maximum of 1880; Norfolk, Va., twenty years record, 81°, the same as maximum of 1880; Hatteras, N. C., sixteen years record, 72°, 2° above maximum of 1884; Kitty Hawk, N. C., sixteen years record, 81°, 1° above maximum of 1880; Palestine, Tex., nine years record, 87°, 2° above maximum of 1887; Rio Grande City, Tex., fourteen years record, 103°, 5° above maximum of 1884; Abilene, Tex., five years record, 92°, 1° above maximum of 1887. In March of preceding years the highest maximum temperatures have generally occurred in New England in 1880; in the lower lake region in 1875; in the extreme northwest in 1889; in the upper Mississippi valley in 1875 or 1879; over the southern plateau region in 1879 or 1887; over the middle plateau region in 1879 or 1888; and along the south Pacific coast in 1879; elsewhere the periods of occurrence were irregular. The reports of United States Army post surgeons and state weather service and voluntary observers show the following maximum temperatures in states and territories where the temperature was reported 80° or above: Citronelle and Wiggins, Ala., 84°; Florence and Fort Lowell, Ariz., 89°; Texarkana, Ark., 85°; Riverside, Cal., 83°; River Bend, Colo., 88°; Alva, Fla., 93°; Millen, Ga., 87°; Caddo Creek, Ind. T., 86°; Kellogg and Eureka Ranch, Kans., 85°; Cameron, La., 89°; Booneville, Miss., 86°; Fort Selden, N. Mex., 90°; New Berne, N. C., 82°; Hardeeville, S. C., 85°; Cog Hill., Tenn., 80°; Camp del Rio, Tex., 105°; Birdsnest and Smithfield, Va., 82°.

The lowest temperature reported by a regular station of the

Signal Service was —30°, at Saint Vincent, Minn., on the 5th. The minimum temperature fell below —20° over a greater part of North Dakota, in northwestern Minnesota, northeastern Wisconsin, and the eastern part of upper Michigan; and was below —10° north of a line traced from central New Hampshire westward to the northern part of lower Michigan, thence southwestward to central Iowa, and thence west-northwest over northeastern Montana. The minimum readings were below zero north of a line traced from extreme northeastern Massachusetts westward, north of the stations on the southern coasts of the lower lakes, to southern Michigan, thence southwestward to central Missouri, thence northwestward to west-central Iowa, thence westward to southeastern Wyoming, thence southward over east-central Colorado, thence westward to south-central Utah, and thence northward over central Montana; and were below 30°, except over the southern half of the Florida Peninsula, at Port Eads, La., Brownsville, Tex., southwestern Arizona, southern and western California, and along the immediate Pacific coast. The highest minimum temperature reported by a regular station of the Signal Service was 48° at Key West, Fla., and the minimum values were above 40° along the California coast south of San Francisco, over extreme southern California, and at Yuma, Ariz. At stations in the south Atlantic states, the Florida Peninsula, the east and west Gulf states, the Rio Grande Valley, Tennessee, the upper Mississippi and Missouri valleys, the southeastern slope of the Rocky Mountains, the southern, middle, and northern plateau regions, and on the north Pacific coast the minimum temperature was as low or lower than previously reported for March. At Charlotte, N. C., the minimum temperature for the current month, 19°, was 1° below the minimum of March, 1888; Hatteras, N. C., sixteen years record, 26°, the same as minimum of 1888; Southport, N. C., fifteen years record, 21°, the same as minimum of 1876; Charleston, S. C., twenty years record, 25°, 3° below minimum of 1876; Savannah, Ga., twenty years record, 26°, 1° below minimum of 1873; Jacksonville, Fla., nineteen years record, 27°, 4° below minimum of two or more preceding years; Cedar Keys, Fla., eleven years record, 30°, 6° below minimum of 1886; Key West, Fla., twenty years record, 48°, 5° below minimum of two or more years; Atlanta, Ga., twelve years record, 17°, 3° below minimum of 1885; Pensacola, Fla., eleven years record, 25°, 6° below minimum of 1885; Mobile, Ala., twenty years record, 25°, 4° below minimum of 1885; Montgomery, Ala., eighteen years record, 21°, 4° below minimum of 1873; Vicksburg, Miss., nineteen years record, 24°, 3° below minimum of two or more years; New Orleans, La., twenty years record, 30°, 6° below minimum of 1885; Shreveport, La., nineteen years record, 22°, 4° below minimum of 1876; Fort Smith, Ark., eight years record, 15°, 8° below minimum of 1888; Little Rock, Ark., eleven years record, 16°, 7° below minimum of 1886; Galveston, Tex., nineteen years record, 30°, 4° below minimum of 1875; Palestine, Tex., nine years record, 20°, 7° below minimum of 1886; San Antonio, Tex., thirteen years record, 21°, 6° below minimum of 1880; Brownsville, Tex., fifteen years record, 31°, 4° below minimum of 1880; Rio Grande City, Tex., fourteen years record, 24°, 8° below minimum of 1884; Chattanooga, Tenn., twelve years record, 15°, 5° below minimum of 1885; Memphis, Tenn., twenty years record, 17°, 1° below minimum of 1876; Davenport, Iowa, nineteen years record, —8°, the same as minimum of 1884; Des Moines, Iowa, twelve years record, —8°, 2° below minimum of 1884; Keokuk, Iowa, nineteen years record, —6°, 4° below minimum of 1873; Springfield, Ill., eleven years record, 2°, 4° below minimum of 1888; Saint Louis, Mo., twenty years record, 6°, 2° below minimum of two or more years; Huron, S. Dak., nine years record —15°, the same as minimum of 1884; Leavenworth, Kans., nineteen years record, zero, 2° below minimum of 1876; Abilene, Tex., five years record, 20°, 2° below minimum of 1886; Fort Stanton, N. Mex., seven years record, 6°, 4° below minimum of 1888; Lava, N. Mex., six years record, 14°, 5° below minimum of 1886; Fort Bowie, Ariz., seven years record, 24°, 4° below minimum of 1886; Salt Lake City, Utah, seventeen years record, zero, 4° below minimum of 1874; Montrose, Colo., six years record, —2°, 5° below minimum of 1888; Walla Walla, Wash., five years record, 7°, 5° below minimum of 1888; Portland, Oregon, nineteen years record, 24°, the same as minimum of 1888. In March of preceding years the lowest minimum temperatures have generally occurred in the east Gulf states in 1885 or 1888; in the upper Mississippi valley in 1873 or 1884; in the Missouri Valley in 1876 or 1888; on the northeastern slope of the Rocky Mountains in 1888; on the north Pacific coast in 1884 or 1888; and on the middle Pacific coast in 1880 or 1888; elsewhere the periods of occurrence were irregular.

The reports of United States Army post surgeons and state weather service and voluntary observers show the following minimum temperature in states and territories where the temperature fell to or below zero: Pokegama Falls, Minn., —40°; Gallatin and Sanborn, N. Dak., —36; Embarrass, Wis., and Grayling, Mich., —35°; Fraser, Colo., —27°; Belvidere, Ill., —26°; Elkader, Iowa, —24°; Webster, S. Dak., —23°; Camp Poplar River, Mont., Fort Niobrara, Nebr., and West Milan, N. H., —22°; Queensbury, N. Y., and Philipsburgh, Pa., —21; East Berkshire, Vt., —19°; Soda Springs, Idaho, and Fairfield, Me., —16°; Fort D. A. Russell, Wyo., —15°; Tannery, W. Va., and Orangeville, Ohio, —14°; Ludlow (2), Mass., —13°; Princeton, Mo., —11°; Nephi, Utah, —10; New Hartford, Conn., —9; Lone Rock, Oregon, —8°; New Providence, Ind., —6°; Tribune, Kans., —5°; Chama and Fort Union, N. Mex., —4°; Flagstaff, Ariz., and Fort Walla Walla, Wash., —2°; Bolar, Va., and Tenafly, N. J., zero.

A noteworthy feature of the month was the extremely high and low temperatures noted over the eastern and southern portions of the country. On the first the temperature was the lowest ever known for March from New Orleans, La., and Brownsville, Tex., where freezing weather prevailed, northward to Keokuk and Des Moines, Iowa, where the temperature was —8°, and from western Florida to southern Texas the temperature was lower than at any time during the past winter. On the 7th the temperature was lower than at any time during the past winter in Massachusetts, Rhode Island, and Connecticut, and in the middle Atlantic states from New York to northern Virginia and westward to eastern Ohio. On the 16th the temperature was lower than at any time during the past winter in the western parts of North and South Carolina and in eastern Tennessee. On the 28th the temperature was the highest on record for the season of the year in Maryland and the eastern portions of Virginia and North Carolina.

## LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather for March, 1890, is shown on chart iv by a line traced westward over the Florida Peninsula in about latitude N. 28° and over the extreme southern part of Louisiana between New Orleans and Port Eads. The western limit of freezing weather is shown by a line traced from the California coast in about latitude N. 40° 30′ westward to the Sacramento Valley north of Red Bluff, Cal., thence east of south over central California, east of the Sacramento and San Joaquin rivers, to about the thirty-seventh parallel, thence eastward over southern Nevada, and thence east of south to south-central Arizona. Compared with the limits of freezing weather for February, 1890, the line showing the southern limit of freezing weather for the current month was about eight degrees farther south on the immediate Atlantic coast; and two to three degrees farther south in the east and west Gulf states. On the Pacific coast and in the southern plateau region the line of freezing weather was somewhat farther north and east than the line traced for the preceding month.

## RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges of temperature occurred in north-central South Dakota and

extreme southern Illinois, where they exceeded 80°, whence they decreased eastward to less than 50° in extreme western New York, thence increased to more than 70° in northeastern New York and northwestern New England, and thence decreased to 40° over extreme southeastern Massachusetts and eastern Maine. From the upper Mississippi and middle Missouri valleys the monthly ranges decreased southeastward to less than 40° over extreme southern Florida and extreme southern Louisiana, southward to less than 60° along the southern portion of the west Gulf coast, southwestward to less than 40° on the extreme south Pacific coast, and westward to less than 30° on the middle and north Pacific coasts.

The following are some of the extreme monthly ranges:

| Greatest. | | Least. | |
|---|---|---|---|
| | ° | | ° |
| Cairo, Ill | 85.0 | Tatoosh Island, Wash | 20.0 |
| Fort Sully, S. Dak | 81.0 | Point Reyes Light, Cal | 26.0 |
| Pueblo, Colo | 78.0 | Port Eads, La | 31.0 |
| Northfield, Vt | 72.0 | San Diego, Cal | 33.0 |
| Sault de Ste. Marie, Mich | 71.0 | Key West, Fla | 34.0 |
| Taylors Ranch, Utah | 70.0 | Eastport, Me | 36.0 |

The following is a summary of reports of damaging frost made by regular and voluntary observers of the Signal Service: On the 1st great damage was caused to fruit and vegetables in the country about Shreveport, La., and Corpus Christi, Tex. On the 2d frost destroyed all kinds of growing crops about Knoxville, Tenn.; at Amité City, Houma, and Grand Coteau, La., the freeze and frost of the first part of the month killed tender vegetables and injured fruit trees; in Alabama the freeze of the 2d and 3d did considerable damage to tender buds, and at Montgomery ice formed one-eighth of an inch thick; a report from Jacksonville, Fla., states that the severe frost of the 2d and 3d badly damaged fruit and vegetables in different sections of the state. On the 2d, 3d, and 6th, heavy frost severely injured vegetation at University, Miss.; the low temperature of the first few days of the month was very destructive to fruit buds, etc., in Kentucky; at Homeland, Fla., the freeze of the 3d injured orange blossoms; at Jupiter, Fla., the heavy frost of the 4th did much damage to vegetation; and at Spartanburgh, S. C., the frost of the 3d killed peach blooms, flowers, and vegetables; heavy frost on 3d, 9th, and 16th caused great damage to tender vegetation in the country around Savannah, Ga. On the 12th killing frost destroyed much fruit in the valley of the Gila River, Ariz. The freezing weather of the 15th and 16th materially damaged all fruit in the vicinity of Springfield, Mo. On the 16th killing frost was reported at Mobile, Ala., and Titusville, Fla.; and light frost occurred at Pensacola, Cedar Keys, and Jupiter, Fla.; at the latter-named stations the frost was nearly two weeks later than any previous record of frost; on this date early vegetation around Charleston, S. C., was greatly damaged by frost, and at Wilmington, N. C., ice formed four inches in thickness, and tender vegetation was killed. On the 17th thousands of young orange trees were reported killed by freezing weather at Homeland, Fla.; at Jupiter and Manatee, Fla., heavy frost did much damage to vegetation; and considerable damage was caused to the fruit and vegetable crops in other sections of Florida.

The dates of killing frost in the Gulf States in the first part of the month about corresponded with the average dates of last killing frost in that region, while the killing frosts of the middle of the month were four to six weeks later than usual in Florida; about one to two weeks later than usual in the southern parts of the east Gulf states; and about seasonable in North and South Carolina. The average date of last killing frost in central Florida is February 1st, and the records of this office give the northern part of Lee Co., Fla., where frost was reported on the 3d, 4th, and 17th of the current month, as the extreme southern limit of frost ever reported for any month.

The southern limit of frost in the Atlantic coast states for the current month was about seven degrees farther south than in February, 1890, and extended southward to Lee Co., Fla.; in the eastern part of the east Gulf states the southern limit was about three degrees farther south than for the preceding month, while to the westward of the Mississippi River and on the Pacific coast frost was reported to the southern borders of the country for both the current and the preceding month.

In the south Atlantic and Gulf states frost was reported most frequently in North Carolina, where it was noted for twenty-five dates; in Georgia and South Carolina for sixteen dates; in Alabama, Arkansas, and Mississippi for thirteen dates; in Louisiana and Texas for ten dates; and in Florida for six dates. On the Pacific coast frost was noted in Oregon for twenty-one dates; in Washington for fourteen dates; in northern California for twenty-three dates; and in southern California for ten dates. On the 19th, 25th, 26th, and 27th no frost was reported in the south Atlantic and Gulf states.

In the south Atlantic and Gulf states frost was reported in nine states on the 2d, 3d, 4th, and 16th; in eight states on the 1st and 15th; in seven states on the 6th and 7th; in six states on the 29th; and in from one to five states, inclusive, on the 5th, 6th to 14th, 17th, 18th, 20th to 24th, 28th, 30th, and 31st. In northern California frost was reported on the 1st to 15th, 19th, 21st, 23d, 24th, 26th, 27th, 28th, and 31st; in southern California on the 10th to 15th, 20th, 21st, 26th, and 31st; in Oregon on the 1st, 3d, 6th to 14th, 18th, 19th, 20th, 23d, 24th, 25th, 27th, 28th, 30th, and 31st; and in Washington on the 1st, 5th, 6th, 8th to 12th, 14th, 17th, 19th, 21st, 30th, and 31st.

## TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for March, 1890:

| Stations. | Temperature at bottom. | | | | Mean temperature of air at the station. |
|---|---|---|---|---|---|
| | Max. | Min. | Range. | Monthly mean. | |
| | ° | ° | ° | ° | ° |
| Boston, Mass | 43.4 | 34.8 | 8.6 | 37.7 | 34.9 |
| Canby, Fort, Wash | 48.0 | 40.5 | 7.5 | 44.7 | 44.0 |
| Cedar Keys, Fla | 75.0 | 39.8 | 35.2 | 60.1 | 60.1 |
| Charleston, S. C | 63.2 | 52.6 | 10.6 | 58.5 | 56.4 |
| Eastport, Me | 37.2 | 34.9 | 2.3 | 35.9 | 29.4 |
| Galveston, Tex | 71.0 | 49.5 | 21.5 | 62.9 | 62.1 |
| Key West, Fla | 81.5 | 64.7 | 16.8 | 73.5 | 70.6 |
| Portland, Oregon | 46.9 | 36.4 | 10.5 | 43.5 | 45.2 |

## PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for March, 1890, as determined from the reports of nearly 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The heaviest monthly precipitation reported for March, 1890, was 19.83, at Sims, Shasta Co., Cal. The monthly precipitation amounted to 17.83 at Upper Mattole, Cal.; to 17.58 at South Fork, Ky.; to 16.70 at Marengo, Ind.; to 16.50 at Delta, Cal., and a depth of 14.20 was reported at Oak Ridge, Mo. On the central coast of Massachusetts, in eastern and south-central Kentucky, north-central Tennessee, southwest-